DEVELOPING NUTRIENT LIMITS IN EXISTING MPDES PERMITS (RENEWALS)

Overview - Steps in Nutrient Limit Development

- Determine if nitrogen and phosphorus are pollutants of concern
- Develop any required Technology-based Effluent Limits
- Determine if numeric criteria are adopted for the receiving water
  - If no numeric criteria, but stream is 303(d) listed for nutrients, cap at current levels
  - If no numeric criteria and stream is not 303(d) listed, require monitoring only
- If numeric criteria are adopted, assess reasonable potential
- Develop any necessary water quality-based effluent limits (WQBELs)
- If necessary, develop general variance effluent limits
- Permittee request for general variance
- Public notice and issue permit
- Individual variances

Are Nitrogen and/or Phosphorus Pollutants of Concern?

- Are there applicable Effluent Limitations Guidelines?
  - 40 CFR 405 – 471
- Is the receiving water listed on the 303(d) list as impaired for nutrients?
- Has monitoring revealed the presence of nutrients in the discharge
  - Permit application
  - DMR data
  - Compliance inspection monitoring
- Nutrients are POC at all POTWs

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Develop Technology-based Nutrient Limits

- Very few permits will have TBELs for nutrients

- Where TBELS apply, development is straightforward and follows established procedures

- 40 CFR 405-471

Water Quality-based Effluent Limits

- After developing TBELs, or if TBELs do not apply and nutrients are POC, Water Quality-based Effluent Limits must be considered

- Assessing the need for WQBELs is dependent on conditions specific to the receiving water
  - Do numeric criteria apply?
  - Is the stream impaired for nutrients?
  - Is there an approved TMDL WLA?
  - Are nutrient limits already in place?
  - Are there downstream considerations?

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Scenarios for Water Quality-based Effluent Limits

- Stream is not impaired for nutrients and numeric criteria are not adopted
- Stream is impaired [303(d) list], TMDL is pending, and numeric criteria are not adopted
- Nutrient TMDL is complete and WLA is in place – Current permit does not yet include WLA-based limits
- Nutrient TMDL is complete and WLA is in place – Current permit includes WLA-based limits
- Stream is impaired, TMDL is pending, and numeric criteria are adopted
- Stream is not impaired and numeric criteria are adopted
- Discharge is to an ephemeral drainage
- Lakes, Reservoirs, downstream concerns

Montana Ecoregions

- http://www.epa.gov/wed/pages/ecoregions/mt_eco.htm

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Stream is not Impaired and Numeric Criteria are not Adopted

- Large rivers and River Breaks level-IV ecoregion
- The narrative standard still applies (ARM 17.30.637)
  - If limits are imposed, variance is not available
- In most cases effluent limits are not necessary
  - Permit should require monitoring for TN and TP
    - For future RP determination/limit development when/if standards are adopted

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Stream is Impaired, TMDL is Pending, and Numeric Criteria are not Adopted

- Large rivers, River Breaks level IV
- If limits were developed in previous permit (capped), maintain them. If not;
- Establish effluent limits by capping nutrient loading at current levels per June 2006 memo
  - Calculate long term average loads for TN and TP
  - Develop average monthly limit (AML) and maximum daily limit (MDL)
    - Effluent limits expressed in lb/day only
- Variance is not available to these dischargers

TMDL is Approved, WLA is assigned - Current Permit Does Not Include Limits (WLA not yet implemented)

- Develop permit limits from the WLA using established procedures (TSD)
- Permittee may request variance if numeric criteria apply to the receiving water
  - See variance discussion below
- If numeric criteria do not apply, variance is not available

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TMDL is Approved, WLA is assigned - Current Permit Already Includes WLA-based Limits

- Maintain current limits
- Variance is available if numeric criteria are adopted
- If permittee is currently complying with the WLA, variance is not needed. ARM 17.30.660(7).
  - WLA-based limits remain in effect
- If permittee cannot comply with WLA
  - May request a variance
    - Final variance limits would likely be based on current performance
- See variance discussion

Stream is Impaired, TMDL is pending, and Numeric Criteria are Adopted

- If previous permit included nutrient limits (capped), maintain them, if not;
- Develop limits based on 2006 memo (Molloy)
- Conduct Reasonable Potential Analysis (RPA)
- If no RP to exceed standards; maintain cap limits
  - This is theoretically impossible (impaired stream conc. should be above the standard), but stranger things have happened.
  - Cap limits would need to be maintained to comply with Molloy
- If RP exists, develop WQBELs
  - WQBELs will likely be based on achieving the standard at end-of-pipe
- If WQBELs appear unattainable, develop variance limits as described in DEQ-12B – See variance discussion below
- Final variance limits are the more stringent of the DEQ-12B limits, or the cap at current load limits
  - The permittee must be contacted and informed of variance
  - Permittee submits a variance request form
- See variance discussion

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Stream is not Impaired and Numeric Criteria are Adopted

- Conduct RPA
- If discharge does not have RP
  - No effluent limits
  - Continue monitoring requirements
    - Quarterly at very least, monthly preferred
      - Will depend on how close the discharge is to having RP
- If RP exists, develop necessary WQBELs
- If WQBELs appear unattainable, permittee may request variance
  - See variance discussion below

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Discharge is to an Ephemeral Drainage

- If discharge is intermittent and does not flow into a perennial or intermittent stream
  - Standards do not apply – see DEQ-12A, 1.1.5
  - Depending on frequency of discharge and distance to downstream water body, limits and/or monitoring may still be necessary
    - Base limits on downstream criteria or narrative standard (cap)
    - If limits are imposed, permittee may request variance
- If discharge is continuous (creates a perennial reach), use TSD to develop effluent limits based on water quality standards, applied at end of pipe
- Permittee may request variance
  - See variance discussion below

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Lakes, Reservoirs, and Downstream Protection

- Where nutrients are POC in a downstream lake or reservoir
  - Limits may be needed, even if previous scenarios appear to make them unnecessary
    - Examples: City of Helena, Townsend, Kalispell, etc.
- Nutrient limits for downstream protection of lakes will apply year round or as dictated by an approved TMDL
- Limits should be based on standards that apply to the lake, reservoir, or downstream waterbody
- How far downstream?
  - Case by case, depending on proximity and size of discharge
  - Townsend? – Yes
  - Three Forks? – No
  - Bozeman? – Maybe because of the size of the discharge
  - TMDLs will drive this consideration much of the time
    - e.g. Helena, Kalispell, Columbia Falls, etc.
- Variances may or may not be available

Water Quality-based Effluent Limits – Reasonable Potential Analysis (RPA)

- Where nutrients are pollutants of concern <u>and numeric nutrient criteria are adopted</u> (wadeable streams and some large rivers) RPA is required unless the discharge is subject to an approved TMDL WLA

- Numeric criteria are in Department Circular DEQ-12A, Table 12A-1, which is read from back to front as follows:
  1. Named reaches first, (if applicable)
  2. Level IV ecoregion (if applicable)
  3. Level III ecoregion (if applicable)
     - Ecoregion values do not apply to large rivers within those ecoregions

- RPA and subsequent WQBEL development follow established TSD methods, with a couple of modifications

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TSD Method
RPA for Nutrients

- Determine projected maximum effluent concentration, background receiving water concentration, and discharge flow rate using standard approach
  - Background = 75th percentile of data
    - *Unless* data set n = 10 or more, **and** collected at the 14Q5 **and** during appropriate season, in which case median could be used
- Receiving water flow rate is the July – October seasonal 14Q5. ARM 17.30.635(2).
  - Use the full seasonal 14Q5 in all cases
- Follow RP method in TSD chapter 3
  - If projected receiving water concentration is less than the numeric criteria WQBEL are not necessary
  - If projected receiving water concentration exceeds the criteria, develop effluent limits

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WQBEL Development for Nutrients

- Develop TSD-based WLA as usual (concentration)
  - Use the July – October seasonal 14Q5, where applicable
  - Calculate the CV where data is available; 0.6 = default
- Back calculate chronic long term average
  - 95th percentile (TSD Table 5-1)
- Calculate AML from chronic LTA
  - 95th percentile, n=4 (TSD Table 5-2)
- Multiply AML by applicable flow to calculate load limit
  - Average design flow for POTWs
  - Maximum 30-day average flow for non-POTWs
- Express final AMLs as both concentration and load

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General Variance Process

- Variances are only available on receiving waters where numeric nutrient criteria are adopted
- Develop applicable WQBELs or apply TMDL-based limits first
- Develop general variance limits if compliance with WQBELs or TMDL-based effluent limits appear unachievable
- Contact permittee and present WQBELs and variance limits
- Inform permittee of process for requesting the variance (form)
- Follow up by mailing the variance request letter and form
- Form must by signed by signatory authority (mayor, company president, manager, etc.)
- Signed variance request form must be received before permit fact sheet is routed for internal review
- WQBELs or TMDL limits go in permit as final limits effective in 2034, variance limits applied as interim effluent limits

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Developing General Variance Limits

- Based on facility design flow - DEQ-12B, Table 12B-1

| | Monthly Average | |
Discharge Category (µg/L)	Total P (µg/L)	Total N (µg/L)
≥ 1.0 MGD	1,000	10,000
< 1.0 MGD	2,000	15,000
Lagoons	Maintain Current Performance	

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Developing General Variance Limits (cont.)

- "Monthly Average" Definition
  - *The sum of the daily discharge values during the period in which the base numeric nutrient standard applies divided by the number of days in the sample*
- Definition equates the variances with long term average concentrations (LTAs)
- The variances are treated as LTAs that must be achieved in the facility discharge
- Final concentration AMLs are calculated from the LTAs
  - Depend on the CV of the TN or TP data set
  - Calculated using TSD Table 5-2, AML, 95th percentile, n=4
- AML is multiplied by applicable flow to calculate average monthly load limit
  - Average design flow for POTWs
  - Maximum 30-day average for non-POTWs
  - Final limit is expressed as load only, as AML

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Developing General Variance Limits (cont.)

Facilities Other Than Lagoons

Total Nitrogen

CV	TSD Table 5-2 Multiplier	AML (µg/L) based on 10,000 µg/L LTA Design Flow > 1.0 MGD	AML (µg/L) based on 15, 000 µg/L LTA Design Flow < 1.0 MGD
0.1	1.08	10,800	16,200
0.2	1.17	11,700	17,550
0.3	1.26	12,600	18,900
0.4	1.36	13,600	20,400
0.5	1.45	14,500	21,750
0.6	1.55	15,500	23,250

Total Phosphorus

CV	TSD Table 5-2 Multiplier	AML (µg/L) based on 1,000 µg/L LTA Design Flow > 1.0 MGD	AML (µg/L) based on 2,000 µg/L LTA Design Flow < 1.0 MGD
0.1	1.08	1,080	2,160
0.2	1.17	1,170	2,340
0.3	1.26	1,260	2,520
0.4	1.36	1,360	2,720
0.5	1.45	1,450	2,900
0.6	1.55	1,550	3,100

These AMLs are multiplied by applicable flow to arrive at final effluent limit (lb/day)

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Developing General Variance Limits (cont.)

- Lagoons
  - Current performance
  - Calculate LTA N and P concentrations
  - Use previous 3 to 5 years of data, as appropriate
  - Where data is available calculate CV; default = 0.6
  - Use LTA and CV to calculate AML; TSD Table 5-2, n=4
  - Multiply AML by average design flow
  - Final limit is load only as an AML

Developing General Variance Limits (cont.)

- DEQ-12B, Part 2.0
  - *Cases will arise in which a permittee is or will be discharging effluent with nitrogen and/or phosphorus concentrations lower than (i.e. better than) the minimum requirements of a general variance, but the resulting concentrations outside of the mixing zone still exceed the base numeric nutrient standards. Such permitted discharges are still within the scope of the general variance, because the statute contemplates that a general variance is allowable if the permittee treats the discharge to, **at a minimum**, the concentrations indicated by 75-5-313(5)(b)(i)and (ii), MCA. Discharges better than those at 75-5-313(5)(b)(i)and (ii) are not precluded from falling under a general variance.*

- Translation: Final general variance limits will be the more stringent of the limits calculated in the previous slides, or current performance, as calculated for lagoon systems.

Optimization Study

- Required in all permits that incorporate a variance
- Discuss in fact sheet; Special Conditions section of permit
  - Optimization study *must* include consideration of trading
- Permittees must be given at least two years to submit results
  - Special condition with compliance schedule to notify when study is complete
- Permit language should stress the intent is to optimize current facility; no rate increases or substantial investment

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Individual Variances

- Available if permittee cannot achieve general variance numbers
  - Requests will likely be more prevalent later in the 20-year variance cycle as the general variance is tightened
- Individual variance applications will be handled by the Water Quality Standards Section
- Development will likely take at least a year and will require rulemaking (formally adopted and published in DEQ-12B
- Once developed and adopted may be incorporated into the permit either as a modification or at next permit renewal

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Individual Variances (cont.)

- If permittee refuses general variance and requests individual variance
  - WQBEL incorporated into renewed discharge permit with compliance schedule
  - Reopener provision may be used if individual variance is granted
  - If individual variance is not granted, permittee must either comply with final WQBEL, or request general variance via major permit modification

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Summary

- Specific receiving water scenarios will drive final nutrient permitting decisions
- Any necessary WQBELs will be developed in the fact sheet in situations where numeric criteria are adopted
- Final limits in the permit will be either the WQBEL/TMDL or the variance-based limits
  - Variance limits require optimization study as Special Condition
- Variance limits will be the LOWER of the actual variance numbers or current performance

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